

U.S. Application No.  
Unknown

Date: January 10, 2002



International Application No.  
PCT/NO00/00214

1-14-02 10/0312078CT

Attorney Docket No.  
HAMSO20.001APC

JC14 Rec'd PCT/PTO 11 JAN 2002

**TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US)  
CONCERNING A FILING UNDER 35 USC 371**

International Application No.: PCT/NO00/00214  
International Filing Date: 22 June 2000  
Priority Date Claimed: July 12, 1999  
Title of Invention: CONNECTOR AND METHOD OF USE OF THE CONNECTOR  
Applicant for DO/EO/US: Stig Bakke

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. (X) This is a **FIRST** submission of items concerning a filing under 35 USC 371.
2. () This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 USC 371.
3. (X) This express request to begin national examination procedures (35 USC 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 USC 371(b) and PCT Articles 22 and 39(1).
4. (X) A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. (X) A copy of the International Application as filed (35 USC 371(c)(2))
  - a) (X) is transmitted herewith (required only if not transmitted by the International Bureau).
  - b) () has been transmitted by the International Bureau.
  - c) (X) a copy of Form PCT/IB/308 is enclosed.
  - d) () is not required, as the application was filed in the United States Receiving Office (RO/US).
6. () A translation of the International Application into English (35 USC 371(c)(2)).
7. (X) Amendments to the claims of the International Application under PCT Article 19 (35 USC 371(c)(3))
  - a) () are transmitted herewith (required only if not transmitted by the International Bureau).
  - b) () have been transmitted by the International Bureau.
  - c) () have not been made; however, the time limit for making such amendments has NOT expired.
  - d) (X) have not been made and will not be made.
8. () A translation of the amendments to the claims under PCT Article 19 (35 USC 371(c)(3)).
9. () An oath or declaration of the inventor(s) (35 USC 371(c)(4)).
10. (X) A copy of the International Preliminary Examination Report with any annexes thereto, such as any amendments made under PCT Article 34.
11. () A translation of the annexes, such as any amendments made under PCT Article 34, to the International Preliminary Examination Report under PCT Article 36 (35 USC 371(c)(5)).

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10/0312070202

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12. (X) An Information Disclosure Statement under 37 CFR 1.97 and 1.98 and PTO Form 1449 with six (6) references.
13. () An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
14. (X) A FIRST preliminary amendment.  
() A SECOND or SUBSEQUENT preliminary amendment.
15. (X) Three (3) sheets of drawings.
16. () A power of attorney and/or address letter.
17. (X) International Application as published.
18. (X) The present application qualifies for small entity status under 37 C.F.R. § 1.27.
19. (X) Other Items or information:  
a. PCT/IPEA/408  
b. PCT/IB/304  
c. PCT/IB/301  
d. PCT/IB/332
20. (X) A return prepaid postcard.
21. (X) The following fees are submitted:

				FEES
BASIC FEE				\$1,040
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	
Total Claims	9 - 20 =	0 ×	\$18	\$0
Independent Claims	2 - 3 =	0 ×	\$84	\$0
Multiple dependent claims(s) (if applicable)			\$280	\$0
TOTAL OF ABOVE CALCULATIONS				\$1040
Reduction by 1/2 for filing by small entity (if applicable). Verified Small Entity statement must also be filed. (NOTE 37 CFR 1.9, 1.27, 1.28)				\$520
TOTAL NATIONAL FEE				\$520
TOTAL FEES ENCLOSED				\$520
amount to be refunded:				\$0
amount to be charged:				\$0

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Unknown

International Application No.  
PCT/NO00/00214

1019/0312070202

Attorney Docket No.  
HAMSO20.001APC

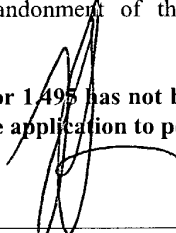
Date: January 10, 2002

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22. (X) The fee for later submission of the signed oath or declaration set forth in 37 CFR 1.492(e) will be paid upon submission of the declaration.
23. (X) A check in the amount of \$520.00 to cover the above fees is enclosed.
24. () Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40 per property.
25. (X) The Commissioner is hereby authorized to charge only those additional fees which may be required, now or in the future, to avoid abandonment of the application, or credit any overpayment to Deposit Account No. 11-1410.

**NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.**

SEND ALL CORRESPONDENCE TO:

  
\_\_\_\_\_  
Michael M. Trenholm  
Reg. No. 37,743  
Customer No. 20,995

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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	:	Stig Bakke	)	Group Art Unit Unknown
			)	
Appl. No.	:	Unknown	)	
			)	
Filed	:	Herewith	)	
			)	
For	:	CONNECTOR AND METHOD	)	
		OF USE OF THE	)	
		CONNECTOR	)	
			)	
Examiner	:	Unknown	)	

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents  
Washington, D.C. 20231

Dear Sir:

Prior to examination, please amend the above referenced application as follows:

**IN THE ABSTRACT:**

Please amend the abstract as follows:

Abstract of the Disclosure

A connector for connection of a pipe end portion of coiled tubing adapted for connecting a piece of downhole equipment. The connector is formed by three separate parts that can be screwed together two and two, of which a radially inner shrinkable adapter sleeve compressively surrounded by an elongate outer adapter and connector sleeve ensures the securing of the end portion of the coiled tubing, whereas a freely projecting, internally threaded end portion of the outer sleeve ensures the connection to the remaining part of the connector in the screwing together. The connector, besides exhibiting improved tensile, flexural and compressive strength properties, is also well suited to absorb torques applied. The inner shrinkable adapter sleeve,

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which has an external jacket surface of an axially conical extent, is provided with external threads, complementarily matched by the internal threads of the outer adapter and connector sleeve, which are formed in the bore-defining inner circumferential surface, which has a conical extent in the axial direction, its conicity complementarily corresponding to the externally conical extent of the inner adapter sleeve.

**IN THE SPECIFICATION:**

Page 1, immediately after the title, please insert:

Related Applications

This is the U.S. National phase under 35 U.S.C. § 371 of International Application PCT/NO00/00214, filed June 22, 2000, and claims the benefit of the Norwegian application 19993437 filed July 12, 1999.

Background of the Invention

Field of the Invention

Page 1, Immediately after Line 15, please insert:

Description of the Related Art

Please amend the paragraph on Page 2, beginning on line 1, as follows:

Existing connectors of this kind normally comprise an adapter sleeve with an externally conical smooth surface. Such an adapter sleeve with a smooth surface will cause a great expansive force on an external adapter and connector sleeve surrounding the adapter sleeve, when the connector is subjected to tensile load. This disadvantageous condition is normally compensated for by increasing the external diameter of the connector, which is also unfortunate and disadvantageous.

Please amend the paragraph on page 2, beginning on line 13, as follows:

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Existing connectors are generally locked by set screws meant to have the task of absorbing torques. This is a particularly unfortunate construction as such screws are generally unsuitable for such a task, and may, at worst, come loose through vibrations, and may fall out, after which the loose set screws may cause damage to the well and downhole equipment.

Please amend the paragraph on page 2, beginning on line 20, as follows:

Therefore, there is a need for a connector and method of connection to remedy or reduce, to a substantial degree, by simple means the drawbacks, disadvantages and limitations of use of conventional connectors of this kind and of other known connectors of similar types, and thus provide a connector for the purposes in question, in which the external diameter is kept as small as possible, and which exhibits, with dimensions corresponding to those of known connectors, a higher tensile end compressive strength and greater resistance towards external torques applied thereto.

Please amend the paragraph on page 2, beginning on line 30 as follows:

#### Summary

The aforementioned needs are satisfied by a connector for connecting the end portion of a pipe, a pipeline, a pipe string or coiled tubing. The connector is formed or provided with at least one connecting device for equipment/tools, and comprises parts that can be screwed together and have aligned bores for the accommodation of said pipe end portion which is secured in the connector in the screwed-together condition of the parts. The connector further comprises a radially inner transversally shrinkable adapter sleeve which is to bear in the connected position at its inner circumferential surface in a clamping manner against the outer jacket surface of the pipe end portion. The inner adapter sleeve has an external conically extending threaded jacket surface that is formed in a view of cooperating with a surrounding outer adapter and connector sleeve with an internal conically extending threaded circumferential surface. The outer adapter and connector sleeve is formed to cooperate with a threaded jacket portion of a socket-like connecting element formed on an end piece having the said connecting device.

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Please amend the paragraph on page 3, beginning on line 9, as follows:

The adapter sleeve is split and can be shrunk around the coiled tubing by the outer adapter and connector sleeve formed with a conical threaded inner surface complementarily corresponding to the conicity of the adapter sleeve. The sleeve wall of the outer adapter and connector sleeve is tapered gradually in the direction of the end piece incorporated in the connector, and can be screwed to the socket-like connecting element of the said end piece, said connecting element having an externally conical sleeve wall tapering towards its free end, complementarily corresponding to the conicity of the outer sleeve, with external threads.

Please amend the paragraph beginning on page 3, line 20, as follows:

The socket-like connecting element of the end piece normally has a smooth cylindrical bore of a diameter selected to slide over the outer diameter of the coiled tubing.

Please amend the paragraph beginning on page 3, line 23, as follows:

The diameter of the internally threaded bore of the outer adapter and connector sleeve exceeds the diameter of the coiled tubing, other than at the end portion positioned at maximal distance from said end piece, wherein the outer adapter and connector sleeve is formed with an annular inward flange of a comparatively large axial extent and of a diameter selected to fit the outer diameter of the coiled tubing.

Please amend the paragraph beginning on page 4, line 19, as follows:

The externally conical adapter sleeve with external left-hand threads, incorporated in the connector according to the invention, will be capable of adopting torques, and the torque applied will tighten the inner adapter sleeve even more firmly to the external wall surface of the coiled tubing.

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Please amend the paragraph beginning on page 5, line 22, as follows:

Then the outer adapter and connector sleeve is screwed, by its internally conical threaded portion, along the externally conical threaded surface of the internal adapter sleeve, complementarily corresponding the conicity of the outer sleeve, and - as the inner diameter of the threads of the outer sleeve decreases - the inner shrinkable sleeve is compressed transversally thereby transferring compressive forces from the outer sleeve to the coiled tubing, which is thereby secured. When an optimal degree of securing has been achieved, the outer sleeve has, from its free end, a free (not in threaded engagement with the inner adapter sleeve) internally conical threaded end portion, which - on adjustment, according to experience, of the position of the inner adapter sleeve relative to the end of the coiled tubing in the position of use - shall have a larger axial longitudinal extent than the depth of entering (depth of screwing) of the socket-like connecting element of the end piece, extending over said depth of entering, conically narrowing towards its free end.

Please amend the paragraph beginning on page 6, line 19, as follows:

These and other objects and advantages of the invention will become more fully apparent from the following description of a non-limiting embodiment taken in conjunction with the accompanying drawings.

#### Brief Description of the Drawings

Please amend the paragraph beginning on page 7, line 4, as follows:

#### Detailed Description of the Preferred Embodiment

Reference will now be made to the drawings wherein like numerals refer to like parts throughout. Fig. 1 illustrates a connector for the connection of the end portion of a pipe, a pipeline, a pipe string or coiled tubing 10 comprises (besides the seals 12 and 14 in the form of



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O-rings positioned in internal circumferential grooves in the connector parts 16 and 18, which can be screwed together) three parts 16, 18 and 20 that can be screwed together.

Please amend the paragraph beginning on page 7, line 17, as follows:

The end piece 16 has a first, internal annular shoulder surface 26, which forms an abutment surface for the end surface of the coiled tubing 10. In an axial distance from this internal, annular abutment surface 26 the externally conical threaded socket-like connecting element 24 is defined by an, axially seen, annular shoulder surface 28 determining the depth of entering/screwing of the connecting element 24 into an outer adapter and connector sleeve 18 forming the second part of the connector.

Please amend the paragraph beginning on page 9, line 18, as follows:

To form a connection using the connector described above, the outer adapter and connector sleeve 18 is first passed over the coiled tubing 10 from the free end thereof, until this outer sleeve 18 adopts a position along the coiled tubing 10, in which its left-hand end of a minimal sleeve wall thickness is positioned at an axial distance from the outer free end of the connecting socket 24, said distance exceeding the axial length of the inner adapter sleeve 20.

Please amend the paragraph beginning on page 9, line 25, as follows:

Then the inner split, radially shrinkable adapter sleeve 20 is pushed and is brought to an initial position with its left-hand end of a maximum inner adapter sleeve thickness at a suitable position (experience will reveal how much this inner adapter sleeve can be expected to be moved axially by the displacing movement of the outer adapter sleeve towards the left during the engagement and displacement of its conical internal threads with/along the cooperating conical external threads of the inner adapter sleeve 20), whereas the constantly decreasing diameter of the bore of the outer sleeve effects a radial compression, transversal "shrinkage", of the inner adapter sleeve, whose compressive forces ensure the securing of the surrounding annular portion of coiled tubing.

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On Page 10, immediately after Line 18, please insert the following paragraph

Although the foregoing description of the preferred embodiments of the invention has shown, described and pointed out the fundamental novel features of the invention, it will be understood that various omissions, substitutions and changes in the form of the detail of the apparatus as illustrated, as well as the uses thereof, may be made by those skilled in the art without departing from the spirit of the present invention. Consequently, the scope of the invention should not be limited to the foregoing discussion, but should be defined by the appended claims.

**IN THE CLAIMS:**

Please amend the Claims as follows:

**WHAT IS CLAIMED IS:**

1. (Amended) A connector for connecting the end portion of a pipe, a pipeline, a pipe string or coiled tubing, wherein the connector is formed or provided with at least one connecting device for equipment/tools, the said connector comprising parts that can be screwed together and have aligned bores for the accommodation of said pipe end portion, which is to be secured in the connector in the screwed-together condition of the parts, said connector further comprising a radially inner transversally shrinkable adapter sleeve, which is to bear, in the connected position, at its inner circumferential surface in a clamping manner against the outer jacket surface of the pipe end portion, characterized in that the adapter sleeve exhibits an external, conically extending threaded jacket surface, which is formed with a view of cooperating with a surrounding outer adapter and connector sleeve with an internal, conically extending threaded circumferential surface, said outer adapter and connector sleeve being formed to cooperate with a threaded jacket portion of a socket-like connecting element formed on an end piece having the said connecting device.

2. (Amended) A connector of Claim 1, wherein the outer adapter and connector sleeve has an axial length that exceeds the double axial length of the inner adapter sleeve, whose length essentially corresponds to the depth of entering/screwing of the socket-like connecting

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element into the outer adapter and connector sleeve, characterized in that the connector parts, which can be screwed together, in the form of the inner sleeve and the socket-like connecting element of the end piece, both have substantially straight cylindrical bores, whereas the outer adapter and connector sleeve has a substantially straight cylindrical outer jacket, so that the conical extent of each of said parts results in a sleeve wall thickness decreasing towards one end, the parts cooperating with each other two and two, in a total wall thickness essentially corresponding to one sleeve wall thickness.

3. (Amended) A connector of Claim 1, wherein at the end located the farthest from said end piece with the socket-like connecting element, the outer adapter and connector sleeve is formed with an inward annular flange defining a sleeve bore section of a diameter generally corresponding to the outer diameter of the coiled tubing.

4. (Amended) A method of establishing the connection and securing of a pipe end portion to a connector that comprises an elongate adapter sleeve, an inner shrinkable adapter sleeve, and an end piece that includes a socket-like connecting element, wherein the elongate adapter sleeve comprises an inner surface extending longitudinally conical so as to define a sleeve bore and wherein the sleeve bore is provided with threads, wherein the inner shrinkable adapter sleeve comprises a threaded jacket surface of an externally conical extent adapted to be received by the threaded sleeve bore and wherein the inner surface of the inner shrinkable adapter sleeve is dimensioned to fit over the end portion of the pipe, wherein the end piece comprises an externally threaded conically extending socket-like element adapted to be received by the threaded sleeve bore, wherein the end piece further comprises an annular stop surface dimensioned to engage the larger diameter bore end of the elongate adapter sleeve, the method comprising:

positioning the elongate adapter sleeve over the end portion of the pipe in a longitudinal manner;

positioning the inner shrinkable adapter sleeve over the end portion of the pipe;

engaging the threaded jacket surface of the inner shrinkable adapter sleeve with the threaded sleeve bore wherein resulting screwing action compresses the inner adapter sleeve gradually during the relative displacement of their cooperating conical surfaces in the longitudinal direction of the connector until a free internally threaded bore wall

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portion of the outer sleeve projects axially beyond the nearest end of the shrunk inner sleeve; and  
engaging the conically extending socket-like connecting element of the end piece into the free internally threaded bore wall portion of the of the outer sleeve until the free end of the elongate adapter sleeve abuts the annular stop surface.

Please add the following new Claims:

5. (New) The connector of Claim 1, wherein the end piece is adapted to receive downhole equipment at the end substantially opposite from the socket-like connecting element.

6. (New) The connector of Claim 1, wherein the external threads of the inner adapter sleeve is left-handed.

7. (New) The connector of Claim 6, wherein the internal surface of the inner adapter sleeve comprises threads that bite into the surface of the pipe to resist displacement of the inner adapter sleeve relative to the pipe.

8. (New) The connector of Claim 7, wherein the threads of the internal surface of the inner adapter sleeve is right-handed.

9. (New) The connector of Claim 6, wherein the external threads of the inner adapter sleeve transfers external torque on the connector so as to further tighten around the pipe so as to resist circumferential displacement of the inner adapter sleeve relative to the pipe.

#### REMARKS

These changes are being made to bring the subject application into better conformance with U.S. practice, to claim the benefit of a previously filed Norwegian application, and to more distinctly claim what the Applicant regards as the invention. No new matter is being introduced. Entrance of this amendment is respectfully requested.

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Attached hereto is a marked-up version of the changes made to the application by the current amendment. The attached page is captioned "**Version with Markings to Show Changes Made**"; additions are shown in **bolded** and deletions are shown [bracketed].

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: 1/10/02

By: 

Michael H. Frenholm  
Registration No. 37,743  
Attorney of Record  
620 Newport Center Drive  
Sixteenth Floor  
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(909)781-9231

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**Version with Markings to Show Changes Made**

**IN THE ABSTRACT:**

The abstract has been amended as follows:

**[ABSTRACT] Abstract of the Disclosure**

A connector [(16,24,18,20)] for [the] connection of a pipe end portion of coiled tubing [(10) comprises means (22)] **adapted** for connecting a piece of downhole [equipment, and] **equipment. The connector** is formed by three separate parts that can be screwed together two and two, of which a radially inner shrinkable adapter sleeve [(20)] compressively surrounded by an elongate outer adapter and connector sleeve [(18)] ensures the securing of the end portion of the coiled tubing [(10)], whereas a freely projecting, internally threaded end portion of the outer sleeve [(18)] ensures the connection to the remaining part [(16,24)] of the connector in the screwing together. [To obtain a connector which,] **The connector**, besides exhibiting [superior] **improved** tensile, flexural and compressive strength properties, is also well suited to absorb torques [applied, the] **applied. The** inner shrinkable adapter sleeve [(20)], which has an external jacket surface of an axially conical extent, is provided with external threads, complementarily matched by the internal threads of the outer adapter and connector sleeve [(18)], which are formed in the bore-defining inner circumferential surface, which has a conical extent in the axial direction, its conicity complementarily corresponding to the externally conical extent of the inner adapter sleeve [(20)].

**IN THE SPECIFICATION:**

Page 1, immediately after the title, please insert --**Related Applications** This is the U.S. National phase under 35 U.S.C. § 371 of International Application PCT/NO00/00214, filed June 22, 2000, and claims the benefit of the Norwegian application 19993437 filed July 12, 1999.—**Background of the Invention**—**Field of the Invention**—.

Page 1, Immediately after Line 15, please insert --**Description of the Related Art**—

Please amend the paragraph on Page 2, beginning on line 1, as follows:

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Existing connectors of this kind normally comprise an adapter sleeve with an externally conical smooth surface. Such an adapter sleeve with a smooth [non threaded] surface will cause a great expansive force on an external adapter and connector sleeve surrounding the adapter sleeve, when the connector is subjected to tensile load. This disadvantageous condition is normally compensated for by increasing the external diameter of the connector, which is also unfortunate and disadvantageous.

Please amend the paragraph on page 2, beginning on line 13, as follows:

Existing connectors are generally locked by set screws meant to have the task of absorbing torques. This is a particularly unfortunate construction as such screws are **generally** [completely] unsuitable for such a task, and may, at worst, come loose through vibrations, and may fall out, after which the loose set screws may cause damage to the well and downhole equipment.

Please amend the paragraph on page 2, beginning on line 20, as follows:

Therefore, **there is a need for a connector and method of connection to** [the objective of the present invention has been to] remedy or reduce, to a substantial degree, by simple means the drawbacks, disadvantages and limitations of use of conventional connectors of this kind and of other known connectors of similar types, and thus provide a connector for the purposes in question, in which the external diameter is kept as small as possible, and which exhibits, with dimensions corresponding to those of known connectors, a higher tensile and compressive strength and greater resistance towards external torques applied thereto.

Please amend the paragraph on page 2, beginning on line 30 as follows:

#### Summary

**The aforementioned needs are satisfied by a connector for connecting the end portion of a pipe, a pipeline, a pipe string or coiled tubing. The connector is formed or provided with at least one connecting device for equipment/tools, and comprises parts that**

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can be screwed together and have aligned bores for the accommodation of said pipe end portion which is secured in the connector in the screwed-together condition of the parts. The connector further comprises a radially inner transversally shrinkable adapter sleeve which is to bear in the connected position at its inner circumferential surface in a clamping manner against the outer jacket surface of the pipe end portion. The inner adapter sleeve has an external conically extending threaded jacket surface that is formed in a view of cooperating with a surrounding outer adapter and connector sleeve with an internal conically extending threaded circumferential surface. The outer adapter and connector sleeve is formed to cooperate with a threaded jacket portion of a socket-like connecting element formed on an end piece having the said connecting device. [A connector of the kind indicated in the introductory part of claim 1, distinguishes itself from conventional and other known couplings through the features comprised by the characterizing part of claim 1.]

Please amend the paragraph on page 3, beginning on line 9, as follows:

**The** [This] adapter sleeve is split and can be shrunk around the coiled tubing by [means of] the outer adapter and connector sleeve formed with a conical threaded inner surface complementarily corresponding to the conicity of the adapter sleeve. The sleeve wall of **the** [this] outer adapter and connector sleeve is **tapered** [tapering] gradually in the direction of the end piece incorporated in the connector, and can be screwed to the socket-like connecting element of **the** said end piece, said connecting element having an externally conical sleeve wall tapering towards its free end, complementarily corresponding to the conicity of the outer sleeve, with external threads.

Please amend the paragraph beginning on page 3, line 20, as follows:

The socket-like connecting element of the end piece normally has a smooth cylindrical bore of a diameter [insignificantly exceeding] **selected to slide over the** outer diameter of the coiled tubing.

Please amend the paragraph beginning on page 3, line 23, as follows:



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The diameter of the internally threaded bore of the outer **adapter and connector** sleeve exceeds[, over almost the entire length thereof,] the diameter of the coiled tubing, [i.e. apart from an] **other than at the** end portion positioned at maximal distance from said end piece, wherein the [external] **outer adapter and connector** sleeve is formed with an annular inward flange of a comparatively large axial extent and of a diameter [which only insignificantly exceeds] **selected to fit** the outer diameter of the coiled tubing.

Please amend the paragraph beginning on page 4, line 19, as follows:

The externally conical adapter sleeve with external left-hand [treads] **threads**, incorporated in the connector according to the invention, will be capable of adopting torques, and the torque applied will tighten the inner adapter sleeve even more firmly to the external wall surface of the coiled tubing.

Please amend the paragraph beginning on page 5, line 22, as follows:

Then the outer adapter and connector sleeve is screwed, by its internally conical threaded portion, along the externally conical threaded surface of the internal adapter sleeve, complementarily corresponding the conicity of the outer sleeve, and - as the inner diameter of the threads of the outer sleeve decreases - the inner shrinkable sleeve is compressed transversally thereby transferring compressive forces from the outer sleeve to the coiled tubing, which is thereby secured. When an optimal degree of securing has been achieved, the outer sleeve has, from its free end, a free (not in threaded engagement with the inner adapter sleeve) internally conical threaded end portion, which - on adjustment, according to experience, of the position of the inner adapter sleeve relative to the end of the coiled tubing in the position of use - shall have a larger axial longitudinal extent than the **depth** [dept] of entering (depth of screwing) of the socket-like connecting element of the end piece, extending over said depth of entering, conically narrowing towards its free end.

Please amend the paragraph beginning on page 6, line 19, as follows:

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These and other objects and advantages of the invention will become more fully apparent from the following description of a non-limiting embodiment taken in conjunction with the accompanying drawings. [A non-limiting example of a present preferred embodiment will be explained in the following with reference to the accompanying drawings, in which:]

#### Brief Description of the Drawings

Please amend the paragraph beginning on page 7, line 4, as follows:

#### Detailed Description of the Preferred Embodiment

[A] Reference will now be made to the drawings wherein like numerals refer to like parts throughout. Fig. 1 illustrates a connector for the connection of the end portion of a pipe, a pipeline, a pipe string or coiled tubing 10 comprises (besides the seals 12 and 14 in the form of O-rings positioned in internal circumferential grooves in the connector parts 16 and 18, which can be screwed together) three parts 16, 18 and 20 that can be screwed together.

Please amend the paragraph beginning on page 7, line 17, as follows:

The end piece 16 has a first, internal annular shoulder surface 26, which forms an abutment surface for the end surface of the coiled tubing 10. In an axial distance from this internal, annular abutment surface 26 the externally conical threaded socket-like connecting element 24 is defined by an, axially seen, annular shoulder surface 28 determining the **depth** [dept] of entering/screwing of the connecting element 24 into an outer adapter and connector sleeve 18 forming the second part of the connector.

Please amend the paragraph beginning on page 9, line 18, as follows:

[The] **To form a connection using the connector described above, the** outer adapter and connector sleeve 18 is first passed over the coiled tubing 10 from the free end thereof, until this outer sleeve 18 adopts a position along the coiled tubing 10, in which its left-hand end of a

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 Filed : Herewith

minimal sleeve wall thickness is positioned at an axial distance from the outer free end of the connecting socket 24, said distance exceeding the axial length of the inner adapter sleeve 20.

Please amend the paragraph beginning on page 9, line 25, as follows:

Then the inner split, radially shrinkable adapter sleeve 20 is pushed and is brought to an initial position with its left hand end **of a maximum inner adapter sleeve thickness** at a suitable **position** (experience will reveal how much this inner adapter sleeve can be expected to be moved axially by the displacing movement of the outer adapter sleeve towards the left during the engagement and displacement of its conical internal threads with/along the cooperating conical external threads of the inner adapter sleeve 20), whereas the constantly decreasing diameter of the bore of the outer sleeve effects a radial compression, transversal "shrinkage", of the inner adapter sleeve, whose compressive forces ensure the securing of the surrounding annular portion of coiled tubing.

On Page 10, immediately after Line 18, please insert the following paragraph

**Although the foregoing description of the preferred embodiments of the invention has shown, described and pointed out the fundamental novel features of the invention, it will be understood that various omissions, substitutions and changes in the form of the detail of the apparatus as illustrated, as well as the uses thereof, may be made by those skilled in the art without departing from the spirit of the present invention. Consequently, the scope of the invention should not be limited to the foregoing discussion, but should be defined by the appended claims.**

#### **IN THE CLAIMS:**

The claims have been amended as follows:

[Amended claims] **WHAT IS CLAIMED IS:**

1. (Amended) A connector [(16,18,20)] for [the connection of] **connecting** the end portion of a pipe, a pipeline, a pipe string or coiled tubing [(10) and] , **wherein the connector is** formed or provided with at least one connecting device [(22)] for equipment/tools,

Appl. No. : Unknown  
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[preferably downhole equipment/tools,] **the** said connector [(16,18,20)] comprising parts [(16, 18 and 20)] that can be screwed together and have aligned bores for the accommodation of said pipe end portion, which is to be secured in the connector in the screwed-together condition of the parts [(16, 18 and 20)], said connector [(16,18,20)] further comprising a radially inner transversally shrinkable adapter sleeve [(20)], which is to bear, in the connected position, at its inner circumferential surface in a clamping manner against the outer jacket surface of the pipe end portion [(10)], characterized in that the adapter sleeve [(20)] exhibits an external, conically extending threaded jacket surface, which is formed with a view of cooperating with a surrounding outer adapter and connector sleeve [(18)] with an internal, conically extending threaded circumferential surface, said outer adapter and connector sleeve [(18)] being formed to cooperate with a threaded jacket portion of a socket-like connecting element [(24)] formed on an end piece [(16) or similar, exhibiting] **having the** said connecting device [(22) for downhole equipment etc].

2. (Amended) A connector [according to claim] **of Claim 1**, wherein the outer adapter and connector sleeve [(18)] has an axial length that exceeds the double axial length of the inner adapter sleeve [(20)], whose length essentially corresponds to the depth of entering/screwing of the socket-like connecting element [(24)] into the outer **adapter and connector** sleeve [(18)], characterized in that the connector parts, which can be screwed together, in the form of the inner sleeve [(20)] and the socket-like connecting element [(24)] of the end piece [(16)], both have **substantially** straight cylindrical bores, whereas the outer **adapter and connector** sleeve [(18)] has a **substantially** straight cylindrical outer jacket, so that the conical extent of each of said parts [(16, 18 and 20)] results in a sleeve wall thickness decreasing towards one end, the parts cooperating with each other two and two, in a total wall thickness essentially corresponding to one sleeve wall thickness.

3. (Amended) A connector [according to claim 1, 2 or 3, characterized in that] **of Claim 1, wherein** at the end located the farthest from said end piece with the socket-like connecting element [(24)], the outer **adapter and connector** sleeve [(18)] is formed with an inward annular flange defining a sleeve bore section of a diameter generally corresponding to the outer diameter of the coiled tubing.

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4. (Amended) A method of establishing the connection and securing of a pipe end portion [(10)] to [in] a connector [(16,18,20)] formed in accordance with one or more of the preceding claims, characterized in that externally over a free pipe end portion (10), which is to be connected to and thereby be secured in the connector, is first passed an elongate adapter sleeve (18) with an inner surface extending longitudinally conical, defining the sleeve bore and provided with threads, after which an inner shrinkable adapter sleeve (20) with a threaded jacket surface of an externally conical extent is passed over the pipe end portion (10) and is positioned in the longitudinal direction thereof, after which the outer adapter and connector sleeve (18) is screwed by its internally threaded circumferential surface on the external threaded portion of the inner adapter sleeve (20) and compresses the inner adapter sleeve (20) constantly more during the relative displacement of their cooperating conical surfaces in the longitudinal direction of the connector, whereby the portion of the outer sleeve (18), compressively enclosing the inner sleeve (20), is constantly decreasing in bore diameter in the screwing, at the completion of which a free internally threaded bore wall portion of the outer sleeve (18) projects axially beyond the nearest end of the shrunk inner sleeve (20), after which the connecting operation is completed in that an externally threaded, conically extending socket-like connecting element (24) of an end piece (16) included in the connector, is screwed into said free internally threaded bore wall portion of the outer sleeve (18), until the free end surfaces of the outer sleeve (18) abuts, in a movement-limiting manner, an annular stop surface (28) by said connecting element (24).] **that comprises an elongate adapter sleeve, an inner shrinkable adapter sleeve, and an end piece that includes a socket-like connecting element, wherein the elongate adapter sleeve comprises an inner surface extending longitudinally conical so as to define a sleeve bore and wherein the sleeve bore is provided with threads, wherein the inner shrinkable adapter sleeve comprises a threaded jacket surface of an externally conical extent adapted to be received by the threaded sleeve bore and wherein the inner surface of the inner shrinkable adapter sleeve is dimensioned to fit over the end portion of the pipe, wherein the end piece comprises an externally threaded conically extending socket-like element adapted to be received by the threaded sleeve bore, wherein the end piece further comprises an annular stop surface dimensioned to engage the larger diameter bore end of the elongate adapter sleeve, the method comprising:**

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 Filed : Herewith

positioning the elongate adapter sleeve over the end portion of the pipe in a longitudinal manner;

positioning the inner shrinkable adapter sleeve over the end portion of the pipe;

engaging the threaded jacket surface of the inner shrinkable adapter sleeve with the threaded sleeve bore wherein resulting screwing action compresses the inner adapter sleeve gradually during the relative displacement of their cooperating conical surfaces in the longitudinal direction of the connector until a free internally threaded bore wall portion of the outer sleeve projects axially beyond the nearest end of the shrunk inner sleeve; and

engaging the conically extending socket-like connecting element of the end piece into the free internally threaded bore wall portion of the of the outer sleeve until the free end of the elongate adapter sleeve abuts the annular stop surface.

Please add the following new Claims:

5. (New) The connector of Claim 1, wherein the end piece is adapted to receive downhole equipment at the end substantially opposite from the socket-like connecting element.

6. (New) The connector of Claim 1, wherein the external threads of the inner adapter sleeve is left-handed.

7. (New) The connector of Claim 6, wherein the internal surface of the inner adapter sleeve comprises threads that bite into the surface of the pipe to resist displacement of the inner adapter sleeve relative to the pipe.

8. (New) The connector of Claim 7, wherein the threads of the internal surface of the inner adapter sleeve is right-handed.

9. (New) The connector of Claim 6, wherein the external threads of the inner adapter sleeve transfers external torque on the connector so as to further tighten around the pipe so as to resist circumferential displacement of the inner adapter sleeve relative to the pipe.

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## CONNECTOR AND METHOD OF USE OF THE CONNECTOR

This invention relates to a connector for the connection of the outer end portion of a pipe, a pipe line, a pipe string or coiled tubing, the connector moreover being formed for the connection of at least one piece of downhole equipment, a downhole tool etc., e.g. a drill bit, a drive engine for same, a measuring instrument etc. to carry out drilling, downhole operations or measuring, which connector comprises connectable parts for the connecting and securing of the pipe end portion, including an inner adapter sleeve and an outer adapter and connector sleeve, which can be connected to the connecting element of an end piece/connecting piece.

Also, the invention relates to a method of establishing the connection and securing the pipe end portion to the connector.

For connecting pieces for coiled tubing it is important, for space reasons, to allow the external diameter to be kept as small as possible, and it is also important that the

connecting piece can stand high tensile loads, high pressure loads and the effect of high torques.

Existing connectors of this kind normally comprise an adapter sleeve with an externally conical smooth surface. Such an adapter sleeve with a smooth non-threaded surface will cause a great expansive force on an external adapter and connector sleeve surrounding the adapter sleeve, when the connector is subjected to tensile load. This disadvantageous condition is normally compensated for by increasing the external diameter of the connector, which is also unfortunate and disadvantageous.

A smooth conical adapter sleeve bearing against the surrounding end portion of coiled tubing, can only absorb a highly limited torque.

Existing connectors are generally locked by set screws meant to have the task of absorbing torques. This is a particularly unfortunate construction as such screws are completely unsuitable for such a task, and may, at worst, come loose through vibrations, and may fall out, after which the loose set screws may cause damage to the well and downhole equipment.

Therefore, the objective of the present invention has been to remedy or reduce, to a substantial degree, by simple means the drawbacks, disadvantages and limitations of use of conventional connectors of this kind and of other known connectors of similar types, and thus provide a connector for the purposes in question, in which the external diameter is kept as small as possible, and which exhibits, with



dimensions corresponding to those of known connectors, a higher tensile and compressive strength and greater resistance towards external torques applied thereto.

A connector of the kind indicated in the introductory part of claim 1, distinguishes itself from conventional and other known couplings through the features comprised by the characterizing part of claim 1.

As opposed to the state of the art, the adapter sleeve of the connector according to the invention has an external conical shape and is provided with external threads (normally left-hand threads), and, on the internal cylindrical surface opposite the coiled tubing, with friction-creating ribs, preferably in the form of (right-hand) threads.

This adapter sleeve is split and can be shrunk around the coiled tubing by means of the outer adapter and connector sleeve formed with a conical threaded inner surface complementarily corresponding to the conicity of the adapter sleeve. The sleeve wall of this outer adapter and connector sleeve is tapering gradually in the direction of the end piece incorporated in the connector, and can be screwed to the socket-like connecting element of said end piece, said connecting element having an externally conical sleeve wall tapering towards its free end, complementarily corresponding to the conicity of the outer sleeve, with external threads.

The socket-like connecting element of the end piece normally has a smooth cylindrical bore of a diameter insignificantly exceeding the outer diameter of the coiled tubing.

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The diameter of the internally threaded bore of the outer sleeve exceeds, over almost the entire length thereof, the diameter of the coiled tubing, i.e. apart from an end portion positioned at maximal distance from said end piece, wherein  
5 the external sleeve is formed with an annular inward flange of a comparatively large axial extent and of a diameter which only insignificantly exceeds the outer diameter of the coiled tubing.

In this annular flange end portion is formed a  
10 circumferential groove which is open in the radially inward direction, and which accommodates a seal in the form of an O-ring. Another annular seal in the form of an O-ring is inserted in an internal circumferential groove formed in the socket-like connecting element in a position closer to the  
15 end piece than the position of an annular shoulder portion forming a stop and abutment surface for the end surface of the outer sleeve in the screwed together condition.

Due to the mutually cooperating, complementarily conical surfaces and sleeve walls tapering in opposite directions,  
20 the screwed-together outer elements, an outer adapter and connector sleeve and the socket-like connecting piece of the end piece, will together exhibit a minimal external diameter.

At the internal "ribs" of the inner, externally conical adapter sleeve, preferably in the form of right-hand threads,  
25 said right-hand threads will resist displacement of the inner sleeve and "bite" into the surface of the coiled tubing.

The externally conical adapter sleeve with external left-hand threads, incorporated in the connector according to the

invention, will be capable of adopting torques, and the torque applied will tighten the inner adapter sleeve even more firmly to the external wall surface of the coiled tubing.

5 By high tensile loads the expansive forces will not be correspondingly high as when the inner adapter sleeve from known technique is externally smooth. By compressive forces the inner shrinkable adapter sleeve will tighten on the surrounding portion of the coiled tubing.

10 In the connecting of the coiled tubing, including securing thereof, and in the joining/screwing together of the different parts of the connector in the establishing of the connection, the procedure is preferably as follows:

15 The outer adapter and connector sleeve is passed over the end portion of the coiled tubing, so that its inward annular flange with the O-ring is the farthest from the end of the coiled tubing, so that the tapering of the sleeve wall towards the free end thereof, is pointing in the same direction as the free end portion of the coiled tubing.

20 As to the positioning of the outer adapter and connector sleeve on the coiled tubing, it is ensured that its free end, where the wall thickness is at its smallest, will be located at a relatively large distance from the end of the coiled tubing. Then the inner split shrinkable externally conical  
25 adapter sleeve with external threads is passed over the coiled tubing. The internal right-hand threads of the inner adapter sleeve act as friction-creating "ribs", and resist gliding of the inner adapter sleeve through

rotation/displacement externally on the coiled tubing (also in the condition of use, when exposed to external forces).

Then the outer adapter and connector sleeve is screwed, by its internally conical threaded portion, along the externally  
5 conical threaded surface of the internal adapter sleeve, complementarily corresponding the conicity of the outer sleeve, and - as the inner diameter of the threads of the outer sleeve decreases - the inner shrinkable sleeve is compressed transversally thereby transferring compressive  
10 forces from the outer sleeve to the coiled tubing, which is thereby secured. When an optimal degree of securing has been achieved, the outer sleeve has, from its free end, a free (not in threaded engagement with the inner adapter sleeve) internally conical threaded end portion, which - on  
15 adjustment, according to experience, of the position of the inner adapter sleeve relative to the end of the coiled tubing in the position of use - shall have a larger axial longitudinal extent than the dept of entering (depth of screwing) of the socket-like connecting element of the end  
20 piece, extending over said depth of entering, conically narrowing towards its free end.

In this position the socket-like connecting element of the end piece is screwed into said free internally threaded connecting portion of the outer sleeve, up to an annular  
25 movement-limiting abutment shoulder defining the socket-like connecting element innermost by the end piece, and determining its depth of entering into the outer sleeve.

Thereby the connection is established, and the end piece may be connected to a piece of downhole equipment, for example a

tool, a drill bit, an engine, an instrument, a measuring device etc. whose kind is not an object of the present invention.

A non-limiting example of a present preferred embodiment will be explained in the following with reference to the accompanying drawings, in which:

Fig. 1 shows an axial section through a connector according to the invention with the end portion of coiled tubing secured therein;

Fig. 2 shows a cross-section through an inner and an outer adapter sleeve in the screwed-together position, corresponding to the established connection according to the sectional plane II-II of Fig. 1; and

Fig. 3 shows a perspective view of said inner adapter sleeve which is split longitudinally and can be shrunk transversally.

A connector for the connection of the end portion of a pipe, a pipeline, a pipe string or coiled tubing 10 comprises (besides the seals 12 and 14 in the form of O-rings positioned in internal circumferential grooves in the connector parts 16 and 18, which can be screwed together) three parts 16, 18 and 20 that can be screwed together.

A first part included in the connector has the form of an end piece 16 with an internally threaded conical bore 22 for the connection of downhole equipment/tools and a connecting socket 24 for the coiled tubing. The connecting socket 24 is

externally conical and provided with external threads.  
Internally the socket 24 is cylindrical, so that the pipe wall is narrowing towards its free end.

The end piece 16 has a first, internal annular shoulder  
5 surface 26, which forms an abutment surface for the end surface of the coiled tubing 10. In an axial distance from this internal, annular abutment surface 26 the externally conical threaded socket-like connecting element 24 is defined by an, axially seen, annular shoulder surface 28 determining  
10 the dept of entering/screwing of the connecting element 24 into an outer adapter and connector sleeve 18 forming the second part of the connector.

The second part of the connector, in the form of an outer adapter and connector sleeve 18, is formed by an adapter  
15 sleeve element of an internally conical shape with an externally straight cylindrical jacket surface, so that the sleeve wall decreases successively in thickness towards the end which is directed towards the end piece 16, whereby the threaded internal wall defining the bore through the outer  
20 adapter and connector sleeve 18, decreases in diameter in the direction away from the end piece 16. At that end, which is positioned at the largest distance from the end piece 16, the outer adapter and connector sleeve 18 is formed with an inward annular flange 30, whose diameter mainly corresponds  
25 to the outer diameter of the coiled tubing 10.

Internally in this annular flange end portion is formed an annular circumferential groove which accommodates a first seal in the form of an O-ring 14. At a certain axial distance from the seal 14 and internally in the end piece 16 is formed

a circumferential groove for a second seal in the form of an O-ring 12.

The third part of the connector is formed by an inner externally conical and threaded adapter sleeve 20, which is shown in perspective in Fig. 3, in cross-section in Fig. 2 and in longitudinal section in Fig. 1.

This internal externally conical adapter sleeve 20 (internally exhibiting a straight cylindrical inner wall surface defining a bore) has a sleeve wall narrowing in the direction away from the end piece 16.

The conicity and threading of the inner adapter sleeve 20 complementarily corresponds to the conicity and threading of the outer adapter and connector sleeve 18. The same applies to the conicity and threading of the socket-like connecting element 24.

The inner adapter sleeve 20 preferably has external left-hand threads and may internally be formed - as a kind of ribs or other friction-creating/displacement-resisting projections opposite the surface of the coiled tubing 10 - with (right-hand) threads 34 which will efficiently resist sliding of the inner adapter sleeve 20 on the coiled tubing 10 on rotation/displacement (in Fig. 2 the coiled tubing 10 has been left out for clarity). Here, cooperating threads on the outer and inner sleeves 18, 20 are identified by the common reference number 36.

The inner adapter sleeve 20 has a through slot 38, which will, together with specially selected spring steel or

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similar, make the adapter sleeve 20 shrinkable in the transversal direction when radial/transversal compressive forces are applied thereto by the outer sleeve 18 as a consequence of relative displacing movement of conical surfaces bearing on one another.

By the connection of the end portion of the coiled tubing 10, i.e. the outer portion which can be accommodated in the axial direction in the connector, the end surface of the coiled tubing 10 is abutting the axially innermost annular abutment surface 26.

The outer adapter and connector sleeve 18 is first passed over the coiled tubing 10 from the free end thereof, until this outer sleeve 18 adopts a position along the coiled tubing 10, in which its left-hand end of a minimal sleeve wall thickness is positioned at an axial distance from the outer free end of the connecting socket 24, said distance exceeding the axial length of the inner adapter sleeve 20.

Then the inner split, radially shrinkable adapter sleeve 20 is pushed and is brought to an initial position with its left-hand end at a suitable (experience will reveal how much this inner adapter sleeve can be expected to be moved axially by the displacing movement of the outer adapter sleeve towards the left during the engagement and displacement of its conical internal threads with/along the cooperating conical external threads of the inner adapter sleeve 20), whereas the constantly decreasing diameter of the bore of the outer sleeve effects a radial compression, transversal "shrinkage", of the inner adapter sleeve, whose compressive



forces ensure the securing of the surrounding annular portion of coiled tubing.

It is assumed that the inner adapter sleeve 20 is firmly connected and secured in a position, in which its left-hand end, according to Fig. 1, is positioned at an axial distance from the left-hand end of the outer adapter and connector sleeve 18, said distance exceeding the effective axial length of the connecting socket 24, so that said connecting socket 24 may now be screwed into the free (without the inner adapter sleeve 20 positioned radially within) end portion, until the free end surface of the connecting socket 24 abuts, in a movement-stopping manner, the, axially seen, outer annular abutment surface 28 of the end piece 16 limiting the depth of entering/screwing of the externally conical threaded connecting socket 24. Thereby the connection is established.

## A m e n d e d       c l a i m s

1. A connector (16,18,20) for the connection of the end  
portion of a pipe, a pipeline, a pipe string or coiled  
tubing (10) and formed or provided with at least one  
5 connecting device (22) for equipment/tools, preferably  
downhole equipment/tools, said connector (16,18,20)  
comprising parts (16, 18 and 20) that can be screwed  
together and have aligned bores for the accommodation of  
said pipe end portion, which is to be secured in the  
10 connector in the screwed-together condition of the parts  
(16, 18 and 20), said connector (16,18,20) further  
comprising a radially inner transversally shrinkable  
adapter sleeve (20), which is to bear, in the connected  
position, at its inner circumferential surface in a  
15 clamping manner against the outer jacket surface of the  
pipe end portion (10), c h a r a c t e r i z e d i n  
that the adapter sleeve (20) exhibits an external,  
conically extending threaded jacket surface, which is  
formed with a view of cooperating with a surrounding  
20 outer adapter and connector sleeve (18) with an  
internal, conically extending threaded circumferential  
surface, said outer adapter and connector sleeve (18)  
being formed to cooperate with a threaded jacket portion  
of a socket-like connecting element (24) formed on an  
25 end piece (16) or similar, exhibiting said connecting  
device (22) for downhole equipment etc.
2. A connector according to claim 1, wherein the outer  
adapter and connector sleeve (18) has an axial length  
that exceeds the double axial length of the inner  
30 adapter sleeve (20), whose length essentially  
corresponds to the depth of entering/screwing of the

socket-like connecting element (24) into the outer sleeve (18), characterized in that the connector parts, which can be screwed together, in the form of the inner sleeve (20) and the socket-like connecting element (24) of the end piece (16), both have straight cylindrical bores, whereas the outer sleeve (18) has a straight cylindrical outer jacket, so that the conical extent of each of said parts (16, 18 and 20) results in a sleeve wall thickness decreasing towards one end, the parts cooperating with each other two and two, in a total wall thickness essentially corresponding to one sleeve wall thickness.

3. A connector according to claim 1, 2 or 3,

characterized in that at the end located the farthest from said end piece with the socket (24), the outer sleeve (18) is formed with an inward annular flange defining a sleeve bore section of a diameter generally corresponding to the outer diameter of the coiled tubing.

4. A method of establishing the connection and securing of a pipe end portion (10) to/in a connector (16,18,20) formed in accordance with one or more of the preceding claims, characterized in that externally over a free pipe end portion (10), which is to be connected to and thereby be secured in the connector, is first passed an elongate adapter sleeve (18) with an inner surface extending longitudinally conical, defining the sleeve bore and provided with threads, after which an inner shrinkable adapter sleeve (20) with a threaded jacket surface of an externally conical extent is passed over the pipe end portion (10) and is positioned in the

longitudinal direction thereof, after which the outer  
 adapter and connector sleeve (18) is screwed by its  
 internally threaded circumferential surface on the  
 external threaded portion of the inner adapter sleeve  
 5 (20) and compresses the inner adapter sleeve (20)  
 constantly more during the relative displacement of  
 their cooperating conical surfaces in the longitudinal  
 direction of the connector, whereby the portion of the  
 outer sleeve (18), compressively enclosing the inner  
 10 sleeve (20), is constantly decreasing in bore diameter  
 in the screwing, at the completion of which a free  
 internally threaded bore wall portion of the outer  
 sleeve (18) projects axially beyond the nearest end of  
 the shrunk inner sleeve (20), after which the connecting  
 15 operation is completed in that an externally threaded,  
 conically extending socket-like connecting element (24)  
 of an end piece (16) included in the connector, is  
 screwed into said free internally threaded bore wall  
 portion of the outer sleeve (18), until the free end  
 20 surfaces of the outer sleeve (18) abuts, in a movement-  
 limiting manner, an annular stop surface (28) by said  
 connecting element (24).

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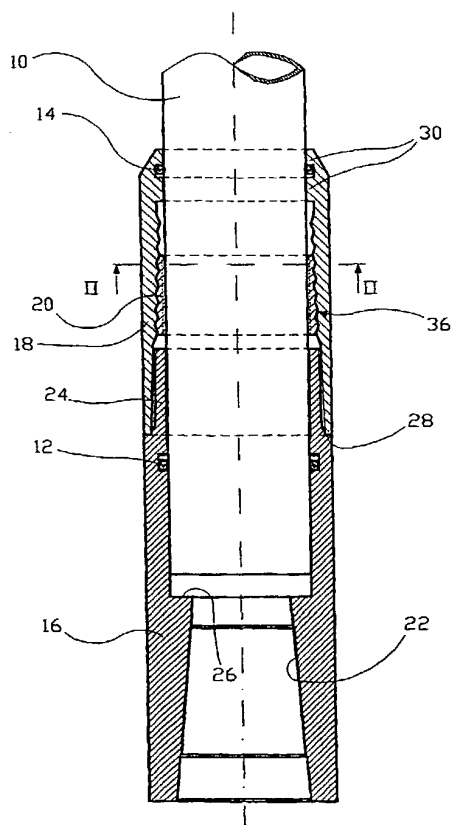
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- (75) Inventor/Applicant (*for US only*): BAKKE, Stig [NO/NO]; Nesjaberget 9, N-4330 Ålgård (NO).
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[Continued on next page]

(54) Title: CONNECTOR AND METHOD OF USE OF THE CONNECTOR



(57) Abstract: A connector (16, 24, 18, 20) for the connection of a pipe end portion of coiled tubing (10) comprises means (22) for connecting a piece of downhole equipment, and is formed by three separate parts that can be screwed together two and two, of which a radially inner shrinkable adapter sleeve (20) compressively surrounded by an elongate outer adapter and connector sleeve (18) ensures the securing of the end portion of the coiled tubing (10), whereas a freely projecting, internally threaded end portion of the outer sleeve (18) ensures the connection to the remaining part (16, 24) of the connector in the screwing together. To obtain a connector which, besides exhibiting superior tensile, flexural and compressive strength properties, is also well suited to absorb torques applied, the inner shrinkable adapter sleeve (20), which has an external jacket surface of an axially conical extent, is provided with external threads, complementarily matched by the internal threads of the outer adapter and connector sleeve (18), which are formed in the bore-defining inner circumferential surface, which has a conical extent in the axial direction, its conicity complementarily corresponding to the externally conical extent of the inner adapter sleeve (20).

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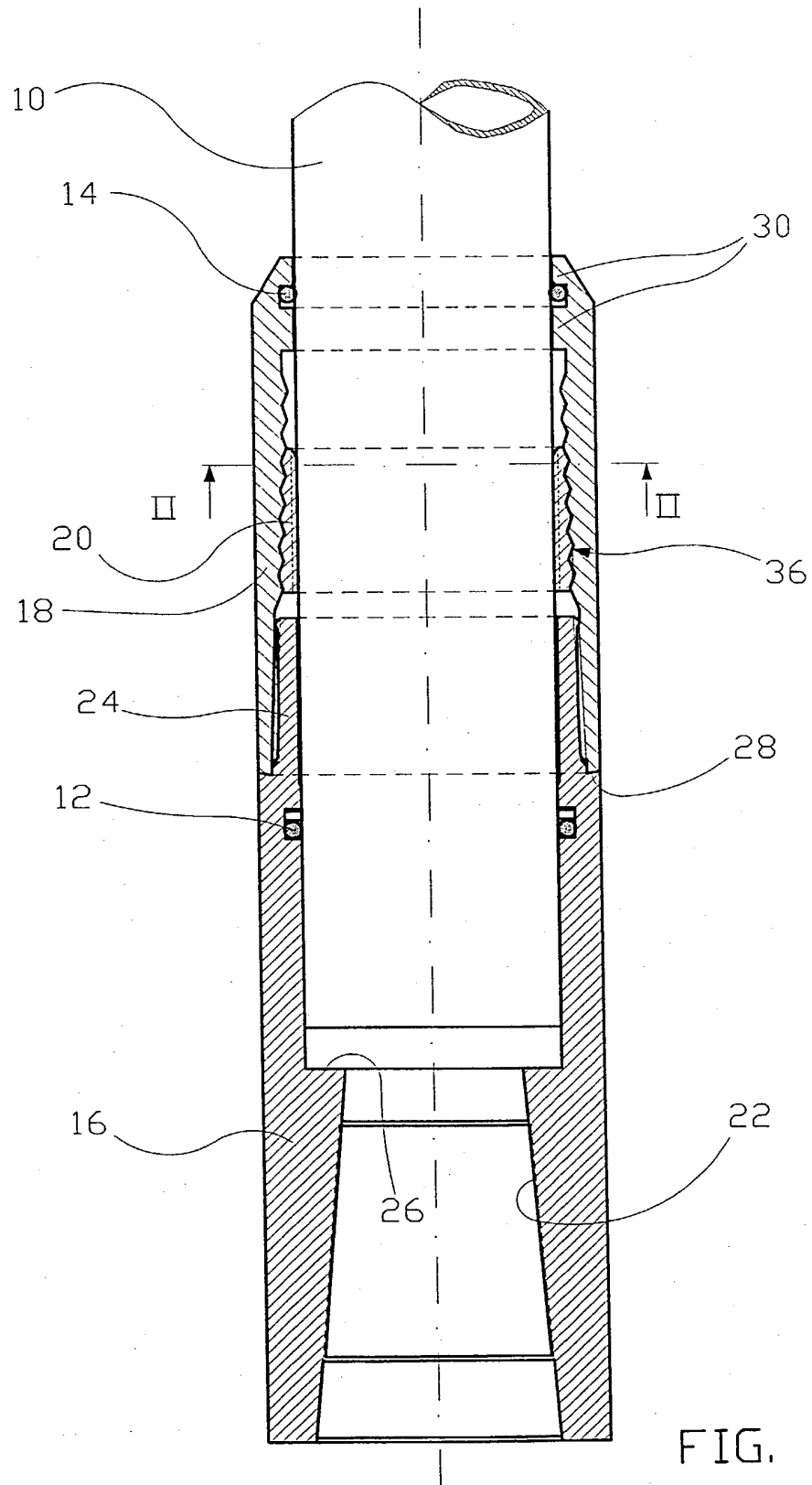


FIG. 1

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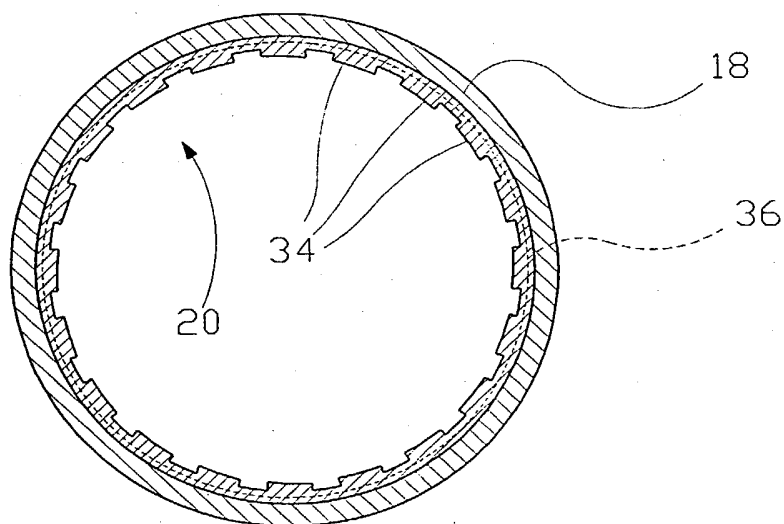


FIG. 2

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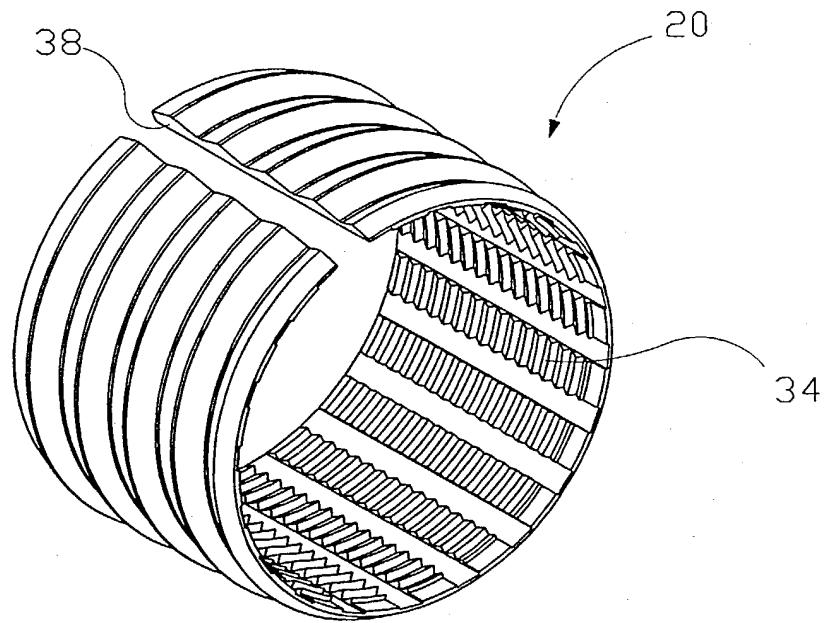
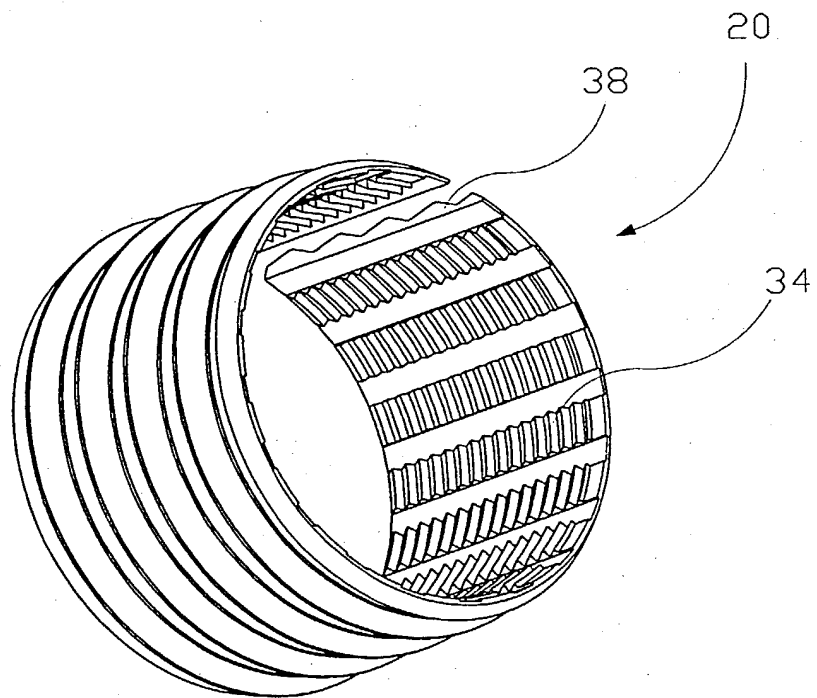


FIG. 3





## DECLARATION - USA PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name;

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled CONNECTOR AND METHOD OF USE OF THE CONNECTOR the specification of which:

- (a) ☐ is attached hereto; or
- (b) ☒ was filed on January 11, 2002 as Application No. 10/031,207.
- (c) ☐ was described and claimed in PCT International Application No. \_\_\_\_\_ filed on \_\_\_\_\_ and as amended under PCT Article 19 on \_\_\_\_\_ (if any) and/or under PCT Article 34 on \_\_\_\_\_ (if any).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above;

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, § 1.56;

I hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent, design or inventor's certificate or any PCT international application(s) listed below and have also identified below any foreign application(s) for patent, design or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed for the same subject matter having a filing date before that of the application(s) of which priority is claimed:

PRIOR FOREIGN APPLICATION(S)

COUNTRY (OR INDICATE IF PCT)	APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY CLAIMED UNDER 35 U.S.C. § 119
NORWAY	19993437	July 12, 1999	✓ YES NO <input type="radio"/>
PCT	PCT/N00000214	June 22, 2000	✓ YES NO <input type="radio"/>

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) listed below, and insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code § 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, § 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

Prior U.S.A. Application(s)

Application No.: \_\_\_\_\_ Filing Date: \_\_\_\_\_ Status: \_\_\_\_\_

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful, false statements may jeopardize the validity of the application or any patent issued thereon.

100 Full name of sole or first inventor: Stig Bakke

Inventor's signature *Stig Bakke* Day 17 Month June Year 2002

Residence (city and country): Nesjoberget 9, N-4330 ÅLGÅRD, NORWAY

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